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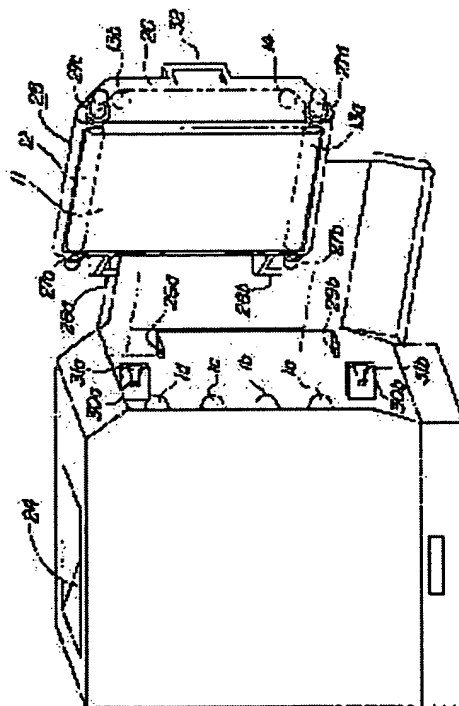
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(54) IMAGE FORMING APPARATUS

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an image forming apparatus constituted so that a transfer belt unit may not interrupt the work inside the device and a developing unit can be attached/detached without attaching/detaching the transfer belt unit to/from the apparatus body.

SOLUTION: As for the typical constitution of the image forming apparatus, the apparatus is provided with an image carrier and a transfer material carrier unit equipped with a transfer material carrier for carrying the transfer material, and for transferring the image formed on the image carrier to the transfer material carried by the transfer carrier, the transfer material carrier unit is constituted so that it can be rocked around a rocking shaft arranged on one end side in the rotary shaft direction of the transfer material carrier.



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CLAIMS

[Claim(s)]

[Claim 1] It is image-formation equipment characterized by the rockable thing a core [the rocking shaft with which said imprint material support unit is prepared in the direction end side of a revolving shaft of said imprint material support in the image-formation equipment which has an imprint material support unit equipped with image support and the imprint material support which supports imprint material, and imprints the image on said image support to the imprint material supported by said imprint material support].

[Claim 2] It is image formation equipment of claim 1 which has further an image support unit equipped with said image support, and is characterized by said image support unit being removable to the body of image formation equipment through the space formed after said imprint material support unit is rocked.

[Claim 3] Said image support unit is image formation equipment of claim 2 characterized by having a development means to develop the latent image on said image support.

[Claim 4] They are claim 1 which two or more said image support is prepared, and is characterized by carrying out the sequential imprint of the image on said each image support at the imprint material supported by said imprint material support thru/or one image formation equipment of 3.

[Claim 5] It is image formation equipment characterized by the rockable thing a core [the rocking shaft with which said image support unit is prepared in the end side of the direction of a revolving shaft of said image support in the image formation equipment which has an image support unit equipped with image support, and imprints the image on said image support to imprint material].

[Claim 6] It is image formation equipment of claim 5 which has further the image formation unit which forms an image in said image support, and is characterized by said image formation unit being removable to the body of image formation equipment through the space formed after said image support unit is rocked.

[Claim 7] It is image formation equipment of claim 6 which said image formation unit is equipped with a photo conductor, and is characterized by the image on said photo conductor being imprinted by said image support.

[Claim 8] Said image formation unit is image formation equipment of claim 7 characterized by having a development means to develop the latent image on said photo conductor.

[Claim 9] It is claim 7 or the image formation equipment of 8 which two or more said photo conductors are prepared, and is characterized by carrying out the sequential imprint of the image on said each photo conductor at said image support.

[Claim 10] Said image formation unit is image formation equipment of claim 6 characterized by having a development means to develop the latent image on said image support.

[Claim 11] It is image formation equipment of claim 10 which two or more said development means are established, and is characterized by said each development means carrying out sequential development of the latent image on said image support.

[Claim 12] In the image formation equipment which has an imprint material support unit equipped with image support and the imprint material support which supports imprint material, and imprints the image

on said image support to the imprint material supported by said imprint material support It is image formation equipment characterized by having the closing motion section which can be opened and closed in order to expose the interior of the body of image formation equipment, interlocking with [actuation / which opens said closing motion section] said imprint material support unit, and being moved out of the body of image formation equipment.

[Claim 13] It is image formation equipment of claim 12 characterized by for said imprint material support unit being supported by said closing motion section, and said imprint material support unit being movable out of the body of image formation equipment with said closing motion section.

[Claim 14] It is claim 12 or the image formation equipment of 13 which has further an image support unit equipped with said image support, and is characterized by said image support unit being removable to the body of image formation equipment through the space formed after said imprint material support unit is moved.

[Claim 15] Said image support unit is image formation equipment of claim 14 characterized by having a development means to develop the latent image on said image support.

[Claim 16] They are claim 12 which two or more said image support is prepared, and is characterized by carrying out the sequential imprint of the image on said each image support at the imprint material supported by said imprint material support thru/or one image formation equipment of 15.

[Claim 17] It is image-formation equipment characterized by to have an image support unit equipped with image support, to have the closing-motion section which can be opened and closed in the image-formation equipment which imprints the image on said image support to imprint material in order to expose the interior of the body of image formation equipment, to interlock with [actuation / which opens said closing-motion section] said image support unit, and to be moved out of the body of image-formation equipment.

[Claim 18] It is image formation equipment of claim 17 characterized by for said image support unit being supported by said closing motion section, and said image support unit being movable out of the body of image formation equipment with said closing motion section.

[Claim 19] It is claim 17 or the image formation equipment of 18 which has further the image formation unit which forms an image in said image support, and is characterized by said image formation unit being removable to the body of image formation equipment through the space formed after said image support unit is moved.

[Claim 20] It is image formation equipment of claim 19 which said image formation unit is equipped with a photo conductor, and is characterized by the image on said photo conductor being imprinted by said image support.

[Claim 21] Said image formation unit is image formation equipment of claim 20 characterized by having a development means to develop the latent image on said photo conductor.

[Claim 22] It is claim 20 or the image formation equipment of 21 which two or more said photo conductors are prepared, and is characterized by carrying out the sequential imprint of the image on said each photo conductor at said image support.

[Claim 23] Said image formation unit is image formation equipment of claim 19 characterized by having a development means to develop the latent image on said image support.

[Claim 24] It is image formation equipment of claim 23 which two or more said development means are established, and is characterized by said each development means carrying out sequential development of the latent image on said image support.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is an object about image formation equipments which adopted the electrophotography method, such as a color copying machine and a color printer, and aims at especially improvement in maintenance nature.

[0002]

[Description of the Prior Art] Although the image formation equipment of the in-line method which has arranged two or more image support from the former to the serial is proposed, when such image formation equipment is divided roughly, there is a configuration of the horizontal arrangement which put two or more image support in order horizontally, and the vertical arrangement arranged in perpendicularly. Although a horizontal arrangement configuration has low height as each description, installation area becomes large, and conversely, although a vertical arrangement configuration can make installation area small, the point that height will become high is got. When the configuration as a desktop printer in recent years is considered, the configuration of the vertical arrangement with a small installation area is advantageous, and the manufacturers who offer this have been increasing in number. [0003] The image formation equipment of the configuration of the conventional vertical arrangement is explained using drawing 5 . The image formation equipment shown in drawing has development unit 100 a-d (100a is un-illustrating) which is four image formation units arranged perpendicularly, and has in each photo conductor drum 101 a-d (101a is un-illustrating) which is image support. Scanner unit 103 a-d is arranged in the horizontal location of each photo conductor drum 101, the interior of the development unit 100 is penetrated and laser is irradiated at the photo conductor drum 101, and it is constituted so that a latent image may be formed. Development means 102 a-d (102a is un-illustrating) is prepared in each development unit 100, the latent image formed on the photo conductor drum 101 is developed with the toner of each color, and a toner image is formed.

[0004] A feed means 104 to contain and feed with imprint material is formed in the equipment lower part, and one sheet carries out separation feed at a time, and it sends out to the electrostatic image transfer belt 105 which is imprint material support. The electrostatic image transfer belt 105 touches two or more photo conductor drums 101 of all, and it rotates, adsorbing imprint material. When passing each photo conductor drum 101, after a color picture is formed by imprinting in superposition, setting the toner image of each color currently supported by each for the fixing means 106, and being heated and pressurized, the imprint material by which adsorption conveyance is carried out is discharged and loaded into the discharge tray 107 prepared in the equipment upper part, and image formation ends it.

[0005] The electrostatic image transfer belt 105 is constituted possible [closing motion] focusing on lower revolving-shaft 105a, as shown in drawing, and it is constituted so that the imprint material which produced the jam can be removed. Moreover, the development unit 100 is constituted removable to the body of equipment, where the electrostatic image transfer belt 105 is opened, they can be detached, attached and exchanged, and they can perform supply of a toner etc.

[0006]

[Problem(s) to be Solved by the Invention] In the image formation equipment of the configuration of the above-mentioned vertical arrangement, although installation area becomes small as mentioned above, there is the description that the body of equipment will become longwise. Therefore, in case the development unit 100 installed in the back side of the electrostatic image transfer belt 105 is exchanged, it must work having to leave the distance for height of the electrostatic image transfer belt 105, and there is a problem that a very unstable activity must be done.

[0007] Moreover, the configuration which makes the electrostatic image transfer belt 105 removable from the body of equipment is also proposed. Although the above-mentioned fault is canceled if it is in this configuration and is in the activity over the development unit 100, inconvenience is in the handling of the activity itself which detaches and attaches the electrostatic image transfer belt 105, and the removed electrostatic image transfer belt 105.

[0008] Then, this invention aims at offering the image formation equipment in which the attachment-and-detachment activity of a development unit is possible, without [without an imprint belt unit serves as hindrance of an activity inside equipment, and] detaching and attaching an imprint belt unit from the body of equipment.

[0009]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the typical configuration of the image formation equipment concerning this invention In the image formation equipment which has an imprint material support unit equipped with image support and the imprint material support which supports imprint material, and imprints the image on said image support to the imprint material supported by said imprint material support Said imprint material support unit is characterized by the rockable thing a core [the rocking shaft prepared in the direction end side of a revolving shaft of said imprint material support].

[0010]

[Embodiment of the Invention] The first operation gestalt of the image formation equipment concerning [first operation gestalt] this invention is explained using drawing. The appearance perspective view of the image formation equipment which drawing 1 requires for this operation gestalt, and drawing 2 are the whole image formation equipment block diagrams. The image formation equipment concerning this operation gestalt is in-line method color picture formation equipment of the vertical arrangement configuration which arranged two or more image support in perpendicularly.

[0011] First, the whole equipment configuration is explained using drawing 2 . The color picture formation equipment shown in drawing is equipped with photo conductor drum 1 a-d which is four image support perpendicularly put side by side. The rotation drive of each photo conductor drum 1 is carried out by the driving means which is not illustrated at the counterclockwise rotation in drawing. Electrification means 2 a-d uniformly charged in each photo conductor drum 1 front face in order around each photo conductor drum 1 according to the hand of cut, Each scanner unit 3 a-d which irradiates a laser beam based on image information, and forms a latent image on each photo conductor drum 1, Developer 4 a-d which is a development means to make a toner adhere to a latent image and to develop negatives as a toner image, Electrostatic image transfer roller 5 a-d which makes the imprint material S imprint the toner image on each photo conductor drum 1, cleaning equipment 6 a-d which removes the transfer residual toner which remained in photo conductor drum 1 front face after an imprint are arranged. Here, each photo conductor drum 1, the electrification means 2 and a developer 4, and cleaning equipment 6 are cartridge-ized in one, and form process cartridge 7 a-d as an image support unit.

[0012] The photo conductor drum 1 applies and constitutes an organic photoconduction body whorl (OPC photo conductor) in the peripheral face of an aluminum cylinder with a diameter of 30mm. The rotation drive of the photo conductor drum 1 is carried out at the counterclockwise rotation in drawing by transmitting the driving force from the driving means which is supported by supporter material free [rotation] and does not illustrate the both ends at one edge.

[0013] The thing of a contact electrification method is used as an electrification means 2. An electrification member is the conductive roller formed in the shape of a roller, and it electrifies photo

conductor drum 1 front face uniformly by ****(ing) electrification bias voltage on this roller while making this roller contact photo conductor drum 1 front face.

[0014] Scanner unit 3 a-d is arranged to the abbreviation horizontal direction of each photo conductor drum 1 a-d, and the image light corresponding to a picture signal is emitted by the laser diode which is not illustrated, and it is irradiated by polygon mirror 8 a-d by which high-speed rotation is carried out by the scanner motor which is not illustrated. The image light reflected in each polygon mirror 8 exposes alternatively photo conductor drum 1 front face [finishing / electrification] through image formation lens 9 a-d, and forms a latent image.

[0015] Developer 4 a-d consists of yellow, a Magenta, cyanogen, and a development counter that contained the toner of each color of black, respectively, respectively. Each developer has developing-roller 10 a-d, and forms the toner image of each color on each photo conductor drum 1 by transferring a toner to the low voltage section of the latent image on the photo conductor drum 1 (development).

[0016] The electrostatic image transfer belt 11 which is imprint material support is arranged so that all photo conductor drum 1 a-d may be touched. The electrostatic image transfer belt 11 is 1011-1014. It consists of film-like belt members with a perimeter [of about 780mm], and a thickness of about 150 micrometers which gave the volume resistivity of omega-cm, and is perpendicularly passed by anchoring at the ends through by four rollers of the belt driving roller 12, the follower rollers 13a and 13b, and a tension roller 14, and circulation migration is carried out at the clockwise rotation in drawing in order to carry out electrostatic adsorption of the imprint material S and to contact the imprint material S to the peripheral face of the left-hand side in drawing at photo conductor drum 1 a-d. Thereby, the imprint material S is conveyed from the follower roller 13a side (below) at the belt driving roller 12 side (above). Moreover, the electrostatic image transfer belt 11 is dedicated to the electrostatic image transfer belt unit 25 which is an imprint material support unit mentioned later.

[0017] Electrostatic image transfer roller 5 a-d is arranged in the location which countered photo conductor drum 1 a-d of the electrostatic image transfer belt 11 inside, and the charge of straight polarity is ****(ed) by the imprint material S through the electrostatic image transfer belt 11 from these electrostatic image transfer roller 5. The toner image of the negative polarity on the photo conductor drum 1 is imprinted in superposition by the electric field by this charge at the imprint material S under contact to the photo conductor drum 1.

[0018] The feed section 15 is arranged at the equipment lower part, carries out two or more sheet loading receipt of the imprint material S, and carries out feed conveyance. the feed roller 17 and retard roller pair which used the roller for a half moon at the time of image formation -- 18 carries out drive rotation according to image formation actuation, and carries out the separation feed of every one imprint material S in the feed cassette 16. the imprint material S with which it was fed -- a tip -- a resist roller pair -- it dashes against 19 and stops, and a location is adjusted, while forming a loop formation and correcting a skew. and the synchronization with rotation of the electrostatic image transfer belt 11 and an image beginning location -- taking -- a resist roller pair -- 19 rotates again and feeds the electrostatic image transfer belt 11 with the imprint material S. That is, the tip of the toner image on the photo conductor drum 1a peripheral surface of the maximum upstream is the timing by which rotation conveyance is carried out at a countering point with the electrostatic image transfer belt 11, and the imprint material S is conveyed so that the recording start location of the imprint material S may be in agreement with the countering point.

[0019] By carrying out a pressure welding to the periphery of the electrostatic image transfer belt 11, as it puts with the electrostatic adsorption roller 22 and the electrostatic image transfer belt 11, and ****(ing) an electrical potential difference between the electrostatic image transfer belt 11 and the electrostatic adsorption roller 22, the imprint material S is constituted so that induction of the charge may be carried out to the dielectric layer of the imprint material S which is a dielectric, and the electrostatic image transfer belt 11 and electrostatic adsorption of the imprint material may be carried out at the periphery of the electrostatic image transfer belt 11. Thereby, it stabilizes and adsorbs on the electrostatic image transfer belt 11, and the imprint material S is conveyed to photo conductor drum 1d of the lowest style, while the toner image of each color is imprinted from photo conductor drum 1 a-d.

Curvature separation is carried out by the curvature of the belt driving roller 12 from the electrostatic image transfer belt 11, and the retrodisplacement copy material S is conveyed by the fixing section 20. [0020] the fixing roller pair which consists of pressurization roller 21b which the fixing section 20 fixes the toner image of two or more colors imprinted by the imprint material S, carries out a pressure welding to rotating heating roller 21a and this, and gives heat and a pressure to the imprint material S -- it has 21. namely, the time of the imprint material S which had the toner image on the photo conductor drum 1 imprinted passing the fixing section 20 -- a fixing roller pair -- heat and a pressure can be applied and permanent fixing of the toner image is carried out by 21 on an imprint material S front face. the retrodisplacement copy material S -- a discharge roller pair -- it is discharged by 23 in the condition of having turned the image side down at the discharge tray 24.

[0021] Next, the electrostatic image transfer belt unit 25 which connotes the electrostatic image transfer belt 11 is explained using drawing 1. The electrostatic image transfer belt 11 is supported by the support frame 26 in the condition of having been passed by anchoring at the ends through the belt driving roller 12, the follower rollers 13a and 13b, and a tension roller 14. Bearing 27 a-d is supported to revolve by the both ends of the belt driving roller 12 and follower roller 13a, and after the periphery section has been exposed, it is supported by the support frame 26, respectively.

[0022] Moreover, the rotation shafts 28a and 28b are formed in the side edge section of the support frame 26. On the other hand, the rotation bearing 29a and 29b which receives this is formed in the body side of equipment, and it has some backlash to the rotation shafts 28a and 28b, and is supporting to revolve rotatable. That is, the electrostatic image transfer belt 11 will be supported rotatable in the side to a hand of cut by the body of equipment.

[0023] Bending section 30 a-d (30c and 30d are un-illustrating) of a body side plate and guide 31 a-d are formed in the location corresponding to each bearing 27 a-d supported to revolve by the belt driving roller 12 and follower roller 13a. And if the electrostatic image transfer belt unit 25 is brought close to the body of equipment, it will be energized by the energization means which is not illustrated while the axis end of the belt driving roller 12 and follower roller 13a is guided at guide 31 a-d (31c and 31d are un-illustrating), and will be positioned because each bearing 27 runs against each bending section 30 of a body side plate. The grasping section 32 is formed in the support frame 26, and it has become a key at the time of closing motion of the electrostatic image transfer belt unit 25, and attachment and detachment.

[0024] It becomes possible to do the attachment-and-detachment activity of a process cartridge 7 only by the switching action, without detaching and attaching the electrostatic image transfer belt unit 25 from the main frame by having constituted like the above. Moreover, a longitudinal direction can be made to open the electrostatic image transfer belt 11 wide by having constituted the electrostatic image transfer belt 11 rotatable in the side to a hand of cut, and since it becomes possible to approach a body enough on the occasion of exchange of a process cartridge 7, an activity can be done an easy and safe thing.

[0025] The [second operation gestalt], next the second operation gestalt of the image formation equipment concerning this invention are explained using drawing. Drawing 3 is the appearance perspective view of the image formation equipment concerning this operation gestalt, attaches the sign same about the part to which explanation overlaps the above-mentioned first operation gestalt, and omits explanation.

[0026] In this operation gestalt, the endocyst of the electrostatic image transfer belt 11 is carried out to the electrostatic image transfer belt unit 33, and the belt driving roller 12 which passes this electrostatic image transfer belt 11 by anchoring at the ends through, the follower rollers 13a and 13b, and a tension roller 14 are supported by the support frame 34, respectively. Bearing 27 a-d (27a and 27b are un-illustrating) is supported to revolve by the both ends of the belt driving roller 12 and follower roller 13a, and after the peripheral face has been exposed, it is supported by the support frame 34, respectively.

[0027] The stop sections 35a and 35b are formed in the tooth-back section of the support frame 34, i.e., photo conductor drum 1 a-d and the opposite side. On the other hand, the door means 38 as the closing motion section is formed in the body of equipment, and the stop holes 36a and 36b are formed in the

inside 33, i.e., electrostatic image transfer belt unit, side. To said stop sections 35a and 35b, these stop holes 36a and 36b have some backlash, are engaged, and they are constituted so that this may hold the electrostatic image transfer belt unit 33.

[0028] The door means 38 is formed in the body of equipment rotatable in the side edge section, and is constituted rotatable in the side to the hand of cut of the electrostatic image transfer belt 11. Therefore, by making this door means 38 stop the electrostatic image transfer belt unit 33, it becomes possible to make a longitudinal direction open the electrostatic image transfer belt 11 wide with closing motion of the door means 38.

[0029] Bending section 30 a-d (30c and 30d are un-illustrating) of a body side plate and guide 31 a-d are formed in the location corresponding to each bearing 27 a-d supported to revolve by the belt driving roller 12 and follower roller 13a. And if the electrostatic image transfer belt unit 25 is brought close to the body of equipment, it will be energized by the energization means which is not illustrated while the axis end of the belt driving roller 12 and follower roller 13a is guided at guide 31 a-d (31c and 31d are un-illustrating), and will be positioned because each bearing 27 runs against each bending section 30 of a body side plate. The grasping section 37 is formed in the support frame 26, and it has become a key at the time of closing motion of the electrostatic image transfer belt unit 25, and attachment and detachment.

[0030] It becomes possible to do the attachment-and-detachment activity of a process cartridge 7 only by the switching action, without detaching and attaching the electrostatic image transfer belt unit 33 from the body of equipment by having constituted like the above. Moreover, a longitudinal direction can be made to open the electrostatic image transfer belt 11 wide by opening the door means 38, and since it becomes possible to approach a body enough on the occasion of exchange of a process cartridge 7, an activity can be done an easy and safe thing.

[0031] Moreover, it is good also as a configuration for which is interlocked with the actuation which opened and closes a closing-motion door without making an imprint belt unit the configuration supported at the closing motion door of image formation equipment, and an imprint belt unit (grasping section of the whole imprint belt unit or an imprint belt unit (handle section)) is moved in the closing-motion direction (it sets to drawing 3 and it is above) of a closing-motion door to a position using energization means (compression spring etc.). The usability at the time of a maintenance can be improved by making it such a configuration.

[0032] The [third operation gestalt], next the third operation gestalt of the image formation equipment concerning this invention are explained. Drawing 4 is the whole image formation equipment block diagram concerning this operation gestalt, attaches the sign same about the part to which explanation overlaps each above-mentioned operation gestalt, and omits explanation.

[0033] Although explained using the electrostatic image transfer belt 11 which is imprint material support as an imprint belt unit in each above-mentioned operation gestalt, this invention is applicable even if it is in the image formation equipment using the middle imprint object which imprints collectively the image imprinted in superposition from image support to imprint material.

[0034] In drawing, the middle imprint belt 40 which is a middle imprint object is arranged so that all photo conductor drum 1 a-d may be touched, and it is passed by anchoring at the ends through by the belt driving roller 12, the follower rollers 13a and 13b, and the tension roller 14. The middle imprint belt 40 carries out circulation migration in the direction of the clockwise rotation in drawing, and photo conductor drum 1 a-d to electrostatic image transfer roller 5 a-d imprints a toner image in superposition.

[0035] the secondary imprint roller 41 energizes to follower roller 13a of middle imprint belt 40 lower limit -- having -- **** -- a resist roller pair -- the imprint material S conveyed from 19 bundles up the color toner image on which it was superimposed in the nip of the middle imprint belt 40 and the secondary imprint roller 41, and is imprinted. The retrodisplacement copy material S is conveyed by the fixing section 20, can apply heat and a pressure, and after carrying out permanent fixing of the toner image, it is discharged and loaded into the discharge tray 24 outside the plane.

[0036] It becomes possible to do the attachment-and-detachment activity of a process cartridge 7 only by the switching action, without detaching and attaching the middle imprint belt 40 from the main frame

by constituting so that the middle imprint belt 40 may open and close in a longitudinal direction like the first operation gestalt, even if it is in the image formation equipment of the above-mentioned configuration. Moreover, since it becomes possible to approach a body enough on the occasion of exchange of a process cartridge 7, an activity can be done an easy and safe thing.

[0037] Moreover, it is good also as a configuration for which constitutes like the second operation gestalt so that a middle imprint belt unit may be supported at a closing motion door, and a middle imprint belt unit is moved out of the body of image formation equipment with a closing motion door.

[0038]

[Effect of the Invention] As explanation was given [above-mentioned], an imprint belt unit can be opened in the image formation equipment concerning this invention and closed in a longitudinal direction by having constituted rockable centering on the rocking shaft in which an imprint material support unit is prepared at the direction end side of a revolving shaft of imprint material support. Therefore, it becomes possible to do the attachment-and-detachment activity of an image support unit only by the switching action, without detaching and attaching an imprint material support unit from the body of equipment. Moreover, since an imprint material support unit can be opened in a longitudinal direction, it becomes possible to approach a body enough on the occasion of exchange of an image support unit, and an activity can be done an easy and safe thing.

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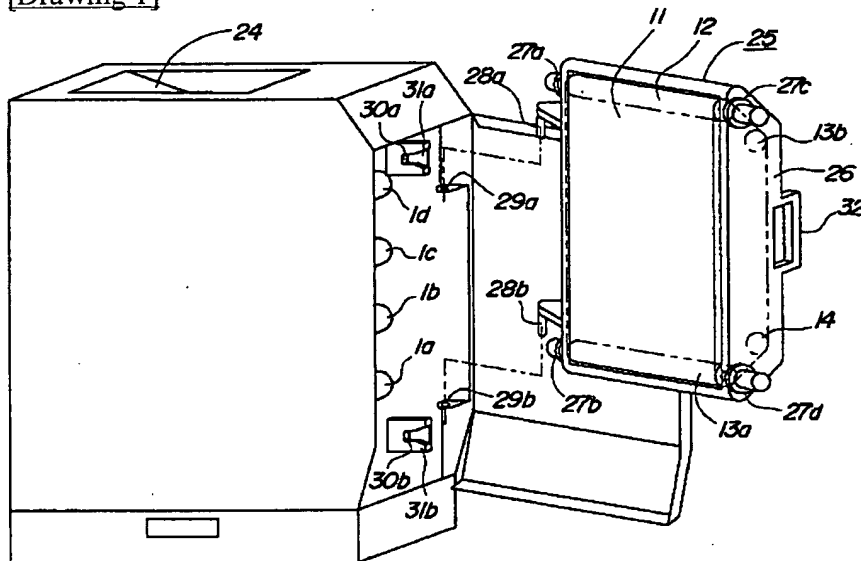
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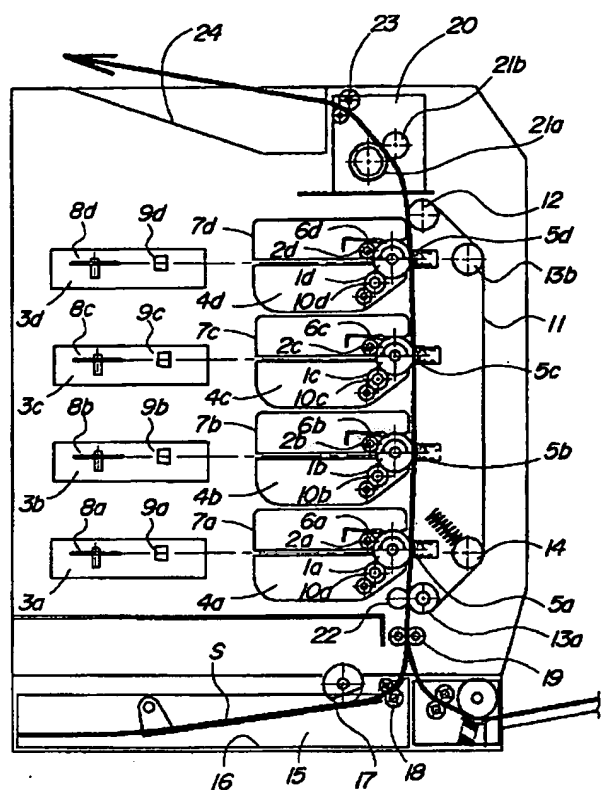
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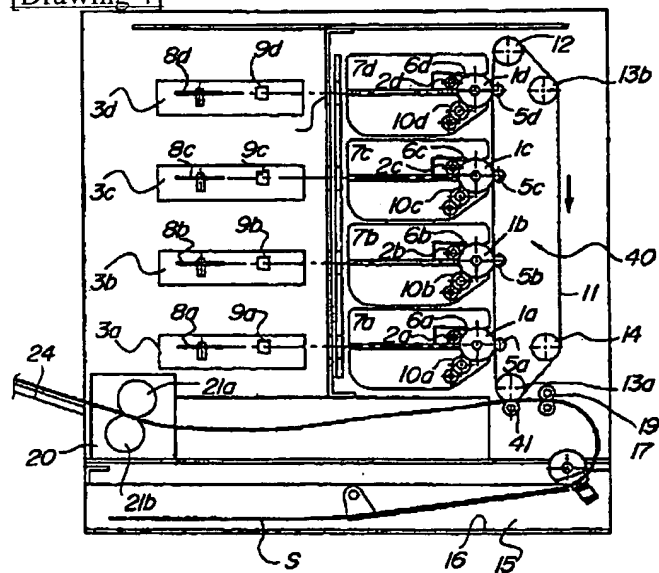
[Drawing 1]



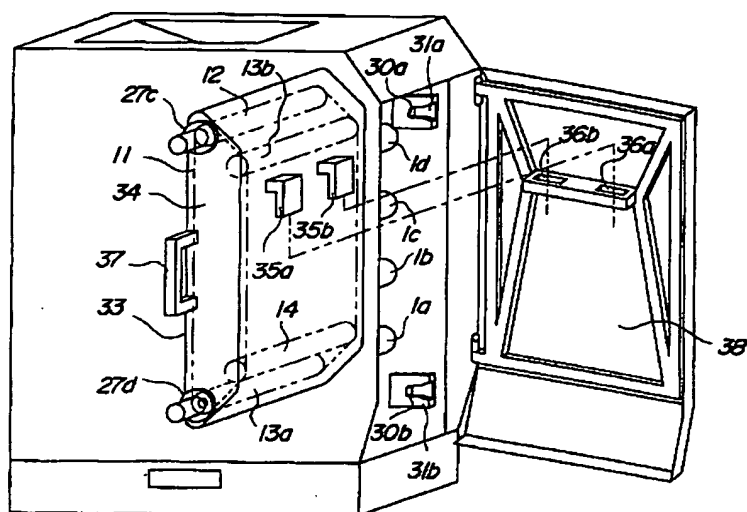
[Drawing 2]



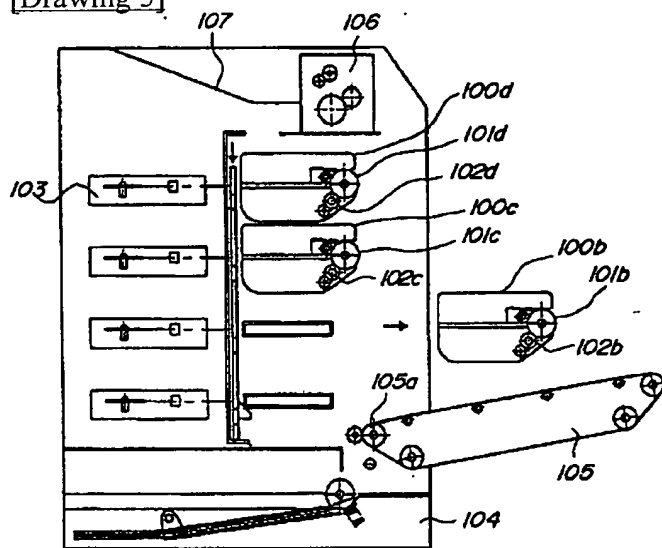
[Drawing 4]



[Drawing 3]



[Drawing 5]



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